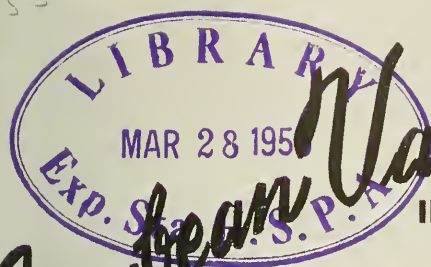


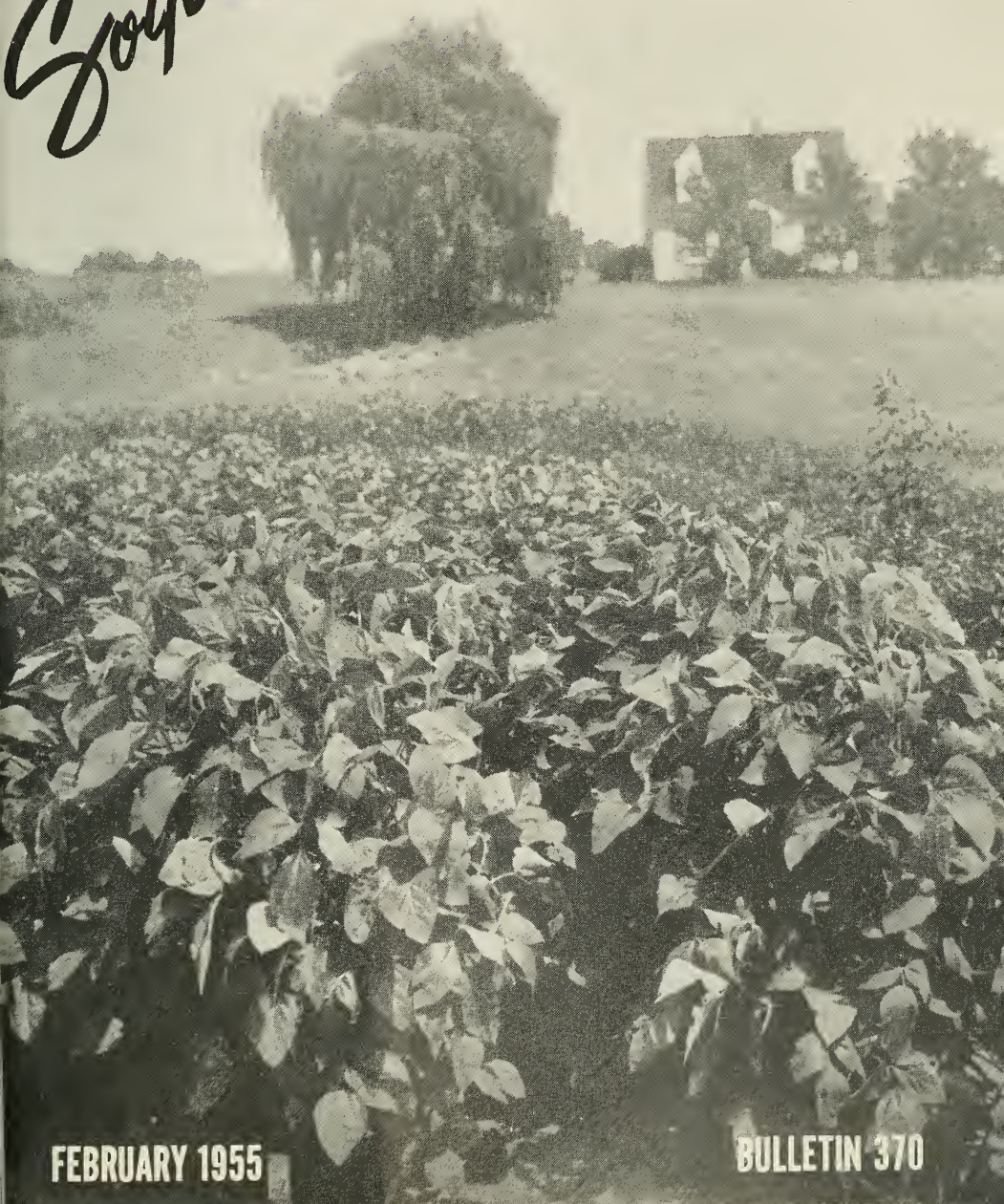
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G-53



Goybean Variety Trials

IN WEST VIRGINIA, 1947-1953



FEBRUARY 1955

BULLETIN 370

WEST VIRGINIA UNIVERSITY AGRICULTURAL EXPERIMENT STATION

Summary

The soybean variety trials reported in this bulletin include the seven-year period from 1947-1953. Seed and hay yields are reported for the soybean variety trials conducted at Morgantown and Point Pleasant. The following list is a summary of the highest producing varieties, at the locations indicated. The selections which are not available for distribution are omitted. Varieties tested for only two or three years are presented in a sub-list.

MORGANTOWN		POINT PLEASANT	
<i>Seed</i>	<i>Hay</i>	<i>Seed</i>	<i>Hay</i>
Mingo	Scioto	Scioto	Scioto
Chief	Chief	Lincoln	Kingwa
Viking	Kingwa	Viking	Lincoln
Lincoln			
Wabash	Wabash	Perry	Perry
Adams	Perry	Wabash	Wabash
Perry			

Acknowledgment

Acknowledgment is made to Mr. D. R. Browning and Mr. L. G. Kile for their assistance in conducting the soybean trials at Point Pleasant and Morgantown respectively.

WEST VIRGINIA UNIVERSITY
AGRICULTURAL EXPERIMENT STATION
COLLEGE OF AGRICULTURE, FORESTRY, AND HOME ECONOMICS
H. R. VARNEY, DIRECTOR
MORGANTOWN

Soybean Variety Trials in West Virginia, 1947-1953

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Introduction

IN THE LAST fifty years there has been a phenomenal increase in production of soybeans in the United States. This has been largely due to the industrial demand for soybean oil. This demand has encouraged the development of improved varieties. New varieties have increased yields and expanded the area in which soybeans may be grown. Soybeans for seed production have their widest usefulness in the corn and cotton belts since they are well adapted to production on extensive acreages.

Soybeans have been used in West Virginia primarily as an annual hay crop. The 8,000 acres reported by the State Crop Reporting Service for 1953 were all grown for hay. Soybeans, alone or in combination with sudan grass, are one of the best supplementary or summer annual forage crops available. Soybeans may be used for either hay or silage production.

Soybeans are best adapted to an open, well-drained, fertile soil into which the roots can readily penetrate. They, like other legumes, have a high lime requirement and produce better on soils having a pH of 6.0 or higher. Soybeans also have a higher potash and phosphate requirement than corn and will produce better on soils with a medium to high content of these minerals.

Soybeans are a summer annual. They should be followed by a winter cover crop which will utilize any available nitrogen left in the soil. If the soybeans are removed for hay, there should be plenty of time to prepare and seed the area to winter barley or winter wheat. These winter grains may be used as companion crops for tall grasses and legumes such as brome grass, orchard grass, or tall fescue, alfalfa and ladino or red clover.

The variety trials reported in this bulletin were conducted in order to compare various varieties when grown under West Virginia conditions so that the Agricultural Experiment Station would have experimental data on which to base soybean variety recommendations.

Varieties

Many varieties have been developed, and several thousand introductions have been tested since the United States Department of Agriculture started work on soybeans about 1898. The organization of the Regional Soybean Laboratory in 1936 stimulated the development and testing of new varieties. The primary objective in this development work has been to secure high-yielding, seed-producing varieties with a high oil and protein content. Yellow-seeded varieties are desired for commercial seed production. Color of the seed is not important when the soybeans are used for forage purposes.

A summary of the plant characteristics of the soybean varieties grown in the variety trials is given in Table 1. These descriptions are based on those given in the United States Department of Agriculture Farmers Bulletin No. 1520, *Soybeans: Culture and Varieties*, and Purdue University Circular 398, *Perry Soybeans for Indiana*.

Ohio 6150 and selections from some of the above varieties do not appear in Table 1 because data on the chemical content were not available. The strains with a number following the variety name in Tables 2, 3, 4, and 5 are selections from the indicated variety such as: Mingo-2; and Kingwa-1.

The soybean varieties grown in the United States are divided into nine maturity groups based on the length of their growing period. The earliest varieties grown in the northern states are classified in group O, whereas the longest season varieties grown in the Gulf states are classified in group VIII. All of the varieties reported in these trials are classified in maturity groups II, III and IV, as designated in the previously mentioned Bulletin No. 1520. Most of the varieties recommended for seed production in West Virginia are classified in maturity group III. Some of the best hay producing varieties are later maturing and are classified in maturity group IV.

Methods

Data reported in Tables 2-5 are based on soybean yields obtained from plots laid out in randomized block design with four replications. They were grown in plots of two rows, 18 feet long. A border of one foot was removed from the ends of each row. The remaining 16 feet were harvested for yield. One row was cut for hay when the pods were well filled and the other for seed yield when ripe.

The trials were conducted on the Agronomy Experiment Station Farm near Morgantown and the Ohio Valley Experiment Station Farm

near Point Pleasant. The soil type on the Agronomy Farm at Morgantown is Rayne silt loam at an altitude of 1,200 feet. Lime has been added as needed, and these plots have been fertilized at the rate of 400 pounds of 5-10-5 per acre. The soil on the Ohio Valley Farm is classified as Wheeling sandy loam at an elevation of 700 feet. Little or no fertilizer was applied the years the soybeans were planted since they usually followed tobacco which had been heavily fertilized.

The soybean varieties were grouped in the tables according to the number of years they were included in the trials. The varieties within these groups were arranged in order of yield. Yields are given for all years in which the variety was grown. Average yields are shown for periods of 2, 3, 5, and 7 years.

Not all of the varieties grown in the trials prior to 1953 are shown in the tables. Some of the low-yielding strains have been discontinued from time to time and new selections added. The average yields and the least significant difference (L.S.D.'s) were calculated on the basis of all the varieties included in the trials and not just those shown in the tables.

Discussion of Results

Yield is a measure of the varietal response of the plant population to environmental conditions. In the variety trials, an attempt was made to reduce variation, in so far as practical, so that all varieties would be grown under comparable conditions.

In comparing the yields of the various soybean varieties it should be kept in mind that unless the difference in yield between two varieties is greater than the least significant difference (L.S.D.), the difference cannot necessarily be attributed to varietal characteristics. The differences within the range of the L.S.D. are attributed to variations that were not under control.

Where varieties are listed in order of yield, all varieties are listed that fall within the range of the highest yield minus the L.S.D.

MORGANTOWN—Seed Production

Of the seventeen varieties grown in 1952 and 1953 for seed production (Table 1) the following seven were the highest yielding in this order: Viking, Lincoln, Chief, Ohio 6150-1, Mingo, Perry, and Adams.

Viking and Chief have been the highest seed-producing varieties during the last three years.

The ten varieties reported for the last five years yielded in the following order: Chief, Wabash, Adams, Viking, Mingo, Scioto, Lincoln, Ohio 6150, Hawkeye, and Kingwa.



KINGWA, a black-seeded, high yielding hay bean originally selected from the Peking variety at Morgantown.

Six of the eight varieties that were grown at Morgantown for the last seven years did not differ significantly in yield. Two of these varieties, Mingo and Hawkeye, belong to maturity group II and are early maturing varieties. In order of yield from highest to lowest, the six highest yielding seed-producing varieties grown for the last seven years were: Mingo, Chief, Viking, Ohio 6150, Lincoln, and Hawkeye.

Using the Comparable Average Yield, eleven highest yielding varieties would be listed in the following order in regard to seed production: Mingo, Wabash, Chief, Ohio 6150-1, Adams, Viking, Viking-2, Ohio 6150, Lincoln, Perry, and Hawkeye.

MORGANTOWN—Hay Production

The following varieties were the highest producers of hay at Morgantown for 1952 in the order listed: Perry, Kingwa-1, Scioto, Chief, Wabash, Kingwa-2 and 46-203-2 (see Table 3). Using the same criterion for those varieties grown for the last three years, one would list them as follows: Chief, Scioto, Kingwa-1, Wabash, and Kingwa-2. Of the varie-

ties grown for five years, the following would be considered superior: Scioto, Chief, Wabash, and Viking. Of the eight varieties grown for seven years, the following were the highest in hay production: Scioto, Chief, Kingwa, and Viking.

Based on the Comparable Average Yield, the most productive varieties for hay production at Morgantown were: Perry, Scioto, Kingwa-1, Chief, Kingwa, Wabash, Viking, Kingwa-2, and 46-203-2. It should be noted that Perry, Kingwa, and Wabash are comparatively late maturing varieties, classified in maturity group IV. Kingwa and the selections from Kingwa retain their leaves as the plants mature. This is a very desirable characteristic for high quality hay.

POINT PLEASANT—Seed Production

Of the seventeen varieties grown at Point Pleasant for seed production in 1952 and 1953 (Table 4), the following seven were the highest yielding in this order: Kingwa-2, Scioto, Perry, Kingwa, Kingwa-1, 46-203-2, and Lincoln.

The best four of the fourteen varieties reported for three years were Kingwa-2, Scioto, Kingwa, and 46-203-2.

Four of the nine varieties grown for five years were outstanding in seed production. They were Scioto, Wabash, Lincoln, and Kingwa.

The five varieties reported for the seven-year period (1947-1953) were not significantly different in yield.

Arranging the varieties in order of yield of seed as measured by the Comparable Average Yield, the highest yielding varieties at Point Pleasant were Kingwa-2, Perry, Scioto, 46-203-2, Wabash, Lincoln, Viking-2, Kingwa, Adams, Chief, and Viking.

POINT PLEASANT—Hay Production

In hay production (Table 5), Perry was the outstanding variety at Point Pleasant in 1952 and 1953. Other varieties in order of hay production were Viking-2, Kingwa-2, 46-203-2, Kingwa-1, Wabash, and Scioto.

Of the thirteen varieties reported for three years, the best seven were Kingwa-2, Viking-2, Scioto, Wabash, Kingwa-1, Kingwa, and Viking.

The best four of the nine varieties over a period of five years were Scioto, Wabash, Kingwa, and Viking.

Of the five varieties reported for seven years, Scioto and Lincoln were best in hay production with Kingwa third.

On the basis of the Comparable Average Yield, the best hay producing varieties would be arranged in this order: Perry, Scioto, Kingwa-2, Viking-2, Wabash, Kingwa, Kingwa-1, and Viking.

The longer growing season at Point Pleasant apparently favors late varieties such as Perry, Wabash, and Kingwa, which are classified in maturity group IV. Mingo and Hawkeye, the only varieties classed in the early maturing group II, were low in production at Point Pleasant.

TABLE 1. CHARACTERISTICS OF THE SOYBEAN VARIETIES INCLUDED IN THE TRIALS

VARIETY	ORIGIN	MATURITY GROUP	COLOR CHARACTERISTICS				SEEDS PER POD	PROTEIN %	OIL %	IODINE No.	SEED PER LB.
			FLOWER	PUBESCENCE	SEED COAT	HILUM					
Adams	Illini x Dunfield	III	White	Gray	Yellow	Light Brown	2-3	40.8	20.8	131	3,100
Chief	Illini x Manchur	III	Purple	Gray	Yellow	Slate to Brown	2-3	41.2	20.9	129	3,500
Hawkeye	Mukden x Richland	II	Purple	Gray	Yellow	Black	2-3	41.2	20.6	130	2,800
Kingsa	Peking	IV	Purple	Gray	Black	Black	2-3	41.6	17.7	133	3,800
Lincoln	Mandarin x Manchur	III	White	Tawny	Yellow	Black	2-4	39.5	21.7	134	3,200
Mingo	Manchu	II	Purple	Tawny	Yellow	Black	2-4	43.4	19.7	132	3,000
Perry*	Potoka x L7-1355	IV	Purple	Gray	Yellow	Gray to Black	2-3	41.2	21.5	—	2,700
Scioto	Manchu	III	Purple	Tawny	Yellow	Black	2-3	42.4	20.7	138	3,400
Viking	Illini x Manchur	III	Purple	Tawny	Yellow	Black	2-3	39.7	21.1	130	3,600
Wabash	Dunfield x Mansoy	IV	White	Gray	Yellow	Light Brown	2-3	40.3	21.0	130	3,200

*Perry Soybeans for Indiana.
Purdue University Circular 398.

TABLE 2. AVERAGE AND ANNUAL YIELD OF SOYBEANS GROWN AT MORGANTOWN 1947 THROUGH 1953

VARIETY	AVERAGE YIELDS IN BU./A.				COMPARABLE* AVERAGE YIELD	AVERAGE ANNUAL YIELDS IN BU./A.								
	3 yr.		5 yr.			7 yr.		1947	1948	1949	1950	1951	1952	1953
	2 yr. 52-53	51-53	49-53	47-53										
Mingo	26.35	23.10	26.26	31.61	31.49	58.2	31.8	36.1	25.9	16.6	37.8	14.9		
Chief	28.15	24.67	28.14	30.81	30.69	43.9	31.1	35.6	31.1	17.7	39.4	16.9		
Viking	29.75	25.10	26.92	30.21	30.09	45.9	31.0	31.0	25.3	15.9	43.7	15.8		
Ohio 6150	25.10	21.93	25.50	29.59	29.47	48.6	31.0	33.8	27.9	15.6	33.3	16.9		
Lincoln	29.33	22.90	25.76	29.44	29.33	43.6	33.7	36.4	24.6	16.8	36.6	14.4		
Hawkeye	22.70	15.23	23.76	29.13	29.01	55.1	30.0	34.0	24.1	15.3	30.1	15.3		
Scioto	25.10	22.30	26.04	28.09	27.97	35.1	31.3	34.4	28.9	16.7	35.8	14.4		
Kingwa	23.95	20.00	23.50	25.63	25.53	38.2	23.7	33.5	24.1	12.0	30.9	17.0		
Wabash	24.85	22.30	27.72		30.95			32.9	38.8	17.2	34.6	15.1		
Adams	25.65	22.17	27.04		30.19			33.8	34.8	15.2	36.1	15.2		
Ohio 6150-1	27.37	23.57			30.37					15.6	37.3	17.8		
Viking-2	24.70	23.07			29.73					17.8	39.5	12.9		
Mingo-2	24.70	22.03			28.40					16.7	35.0	14.4		
46-203-2	23.40	21.57			27.80					17.9	31.5	15.3		
Kingwa-1	23.85	21.10			27.19					15.6	31.0	16.7		
Kingwa-2	23.95	20.13			25.95					12.5	31.9	16.0		
Perry	25.80				29.11						34.2	17.4		
Number of varieties in trial						18	20	18	17	20	18	17		
Average yield in bushels per acre		1.21	2.41	2.63		44.97	27.73	32.96	28.35	15.82	34.87	15.67		
L.S.D., .05	4.34					6.80	5.72	4.52	9.14	4.64	6.79	3.55		

*The *Comparable Average Yield* was calculated by adding the annual yields of a variety and dividing this by the sum of the average yields of all varieties for the same years. This gave the percentage rating. The average yield of all varieties for the entire period was multiplied by the percentage rating obtained for the variety; this gave the *Comparable Average Yield* of the variety.

TABLE 3. AVERAGE AND ANNUAL HAY YIELDS OF SOYBEANS GROWN AT MORGANTOWN 1947 THROUGH 1953

VARIETY	AVERAGE YIELD IN TONS PER ACRE				COMPARABLE* AVERAGE YIELD	AVERAGE ANNUAL YIELDS IN TONS PER ACRE							
	2 yr.	3 yr.	5 yr.	7 yr.		1947	1948	1949	1950	1951	1952	1953	
	52-53	51-53	49-53	47-53									
Scioto Chief Kingwa Viking	2.51	2.32	2.45	2.52	2.51	3.47	1.93	3.17	2.10	1.94	3.35	1.77	
	2.51	2.34	2.43	2.48	2.46	3.31	1.91	3.01	2.08	1.99	3.26	1.68	
	2.16	1.98	2.22	2.43	2.42	4.01	1.93	3.03	2.10	1.63	2.54	1.78	
	2.13	2.02	2.28	2.41	2.40	3.41	2.06	2.94	2.41	1.80	2.37	1.89	
Mingo	1.93	1.82	2.06	2.13	2.12	2.73	1.89	2.36	1.60	2.57	1.29	2.48	
Hawkeye	1.89	1.79	2.00	2.08	2.07	2.94	1.63	2.54	2.09	1.61	2.36	1.41	
Ohio 6150	2.22	1.96	2.05	2.06	2.05	2.86	1.29	2.29	2.09	1.45	2.57	1.87	
Lincoln	1.75	1.72	1.92	2.05	2.04	2.50	2.22	2.70	1.76	1.66	1.93	1.57	
Wabash	2.45	2.19	2.38		2.42			2.81	2.51	1.67	3.19	1.72	
Adams	2.01	1.85	2.06		2.10			2.46	2.31	1.52	2.50	1.50	
Kingwa-1	2.54	2.25			2.47					1.66	3.06	2.02	
Kingwa-2	2.36	2.13			2.34					1.69	2.80	1.91	
46-203-2	2.35	2.08			2.28			2.24		1.54	3.00	1.69	
Viking-2	1.86	1.90			2.09					1.99	1.96	1.75	
Ohio 6150-2	2.02	1.86			2.05					1.55	1.80	1.50	
Mingo-2	1.97	1.82			2.00					1.54	2.57	1.36	
Perry	2.71				2.74					3.55		1.86	
Number of varieties in trial						18	20	18	17	20	18	17	
Average yield in tons per acre						2.960	1.740	2.674	2.145	1.662	2.669	1.698	
L.S.D. .05	.27	.22	.19	.19		.59	.55	.35	.51	.37	.56	.24	

*See footnote Table 2.

TABLE 4. AVERAGE AND ANNUAL SEED YIELDS OF SOYBEANS GROWN NEAR POINT PLEASANT 1947 THROUGH 1953

VARIETY	AVERAGE YIELDS IN BU./A.				COMPARABLE* AVERAGE YIELD	AVERAGE ANNUAL YIELDS IN BU./A.							
	2 yr. 52-53	3 yr. 51-53	5 yr. 49-53	7 yr. 47-53		1947	1948	1949	1950	1951	1952	1953	
Scioto	28.05	27.03	26.98	26.69	29.73	40.9	32.0	26.1	27.7	25.0	25.7	30.4	
Lincoln	24.15	24.23	25.56	27.79	26.89	34.7	29.2	34.3	20.8	24.4	23.2	25.1	
Kingwa	27.70	26.03	25.30	26.94	26.07	34.7	27.4	31.0	17.4	22.7	22.7	32.7	
Hawkeye	20.10	22.47	23.98	26.33	25.48	31.8	32.6	30.5	22.0	27.2	22.3	17.9	
Mingo	19.45	20.77	23.26	25.87	25.04	32.7	32.1	30.0	24.0	23.4	21.2	17.7	
Wabash	21.80	23.47	26.08		27.40			35.0	25.0	26.8	19.9	23.7	
Chief	21.05	22.00	24.54		25.78			32.6	24.1	23.9	19.5	22.6	
Viking	21.65	24.67	24.52		25.76			29.2	19.4	30.7	20.8	22.5	
Ohio 6150	17.90	19.20	23.44		24.63		31.3	33.8	25.8	21.8	21.9	13.9	
Kingwa-2	29.10	28.30			31.17					26.8	27.0	31.1	
46-203-2	24.75	24.90			27.43					25.0	21.5	28.2	
Viking-2	22.70	24.00			26.43					26.6	19.2	26.2	
Adams	23.00	23.43			25.81				20.8	24.3	25.0	21.0	
Kingwa-1	24.90	22.80			25.11					18.6	18.0	31.8	
Perry	27.75				30.98						26.2	29.3	
Ohio 6150-2	21.10				23.56						22.2	20.2	
Mingo-2	21.00				23.44						19.0	23.0	
Number of varieties in trial						9	11	15	17	16	18	17	
Average yield in bushels per acre						33.9	30.07	30.41	22.20	24.1	21.76	24.55	
L.S.D..05	5.91	3.50	2.30	2.34		3.68	5.58	5.6	5.48	4.80	5.92	7.92	

*See footnote Table 2.

TABLE 5. AVERAGE AND ANNUAL HAY YIELDS OF SOYBEANS GROWN NEAR POINT PLEASANT 1947 THROUGH 1953

VARIETY	AVERAGE YIELD IN TONS PER ACRE				COMPARABLE* AVERAGE YIELD	AVERAGE ANNUAL YIELDS IN TONS PER ACRE							
	2 Yt. 52-53	3 Yt. 51-53	5 Yt. 49-53	7 Yt. 47-53		1947	1948	1949	1950	1951	1952	1953	
Setoto	2.51	2.81	2.72	2.95	2.93	4.32	2.73	3.20	1.96	3.42	1.89	3.13	
Kingwa	2.43	2.66	2.56	2.66	2.64	3.01	2.78	3.21	1.63	3.13	1.80	3.05	
Lincoln	2.41	2.54	2.32	2.83	2.27	2.03	2.33	3.02	1.57	2.20	1.90	2.93	
Hawkeye	2.33	2.35	2.18	2.20	2.18	1.97	2.49	2.36	1.49	2.40	1.87	2.79	
Mingo	2.19	2.21	2.17	2.13	2.11	2.08	1.95	2.52	1.59	2.26	1.77	2.61	
Wabash	2.56	2.75	2.70		2.68			3.07	2.21	3.12	1.80	3.32	
Viking	2.44	2.60	2.55		2.53			3.40	1.58	2.91	1.83	3.05	
Chief	2.38	2.54	2.43		2.41			2.96	1.55	2.85	1.83	2.94	
Ohio 6150	2.15	2.17	2.27		2.26		1.79	3.38	1.49	2.21	1.75	2.54	
Kingwa-2	2.77	2.92			2.78					3.22	2.26	3.28	
Viking-2	2.80	2.88			2.74					3.06	1.92	3.67	
Kingwa-1	2.58	2.73			2.59					3.03	1.97	3.18	
Adams	2.48	2.34			2.23				2.21	2.08	1.92	3.03	
Perry	3.20				3.10					2.38	4.01		
46-203-2	2.69				2.40					2.18	1.79	3.59	
Ohio 6150-2	2.48				2.40						1.84	3.11	
Mingo-2	2.37				2.29						1.79	2.94	
Number of varieties in trial						9	11	15	17	16	18	17	
Average yield in tons per acre						2.599 .35	2.284 .40	2.966 .63	1.628 .34	2.652 .58	1.887 .35	3.128 .58	
L.S.D. .05	.33	.31	.24	.20									

*See footnote Table 2.

